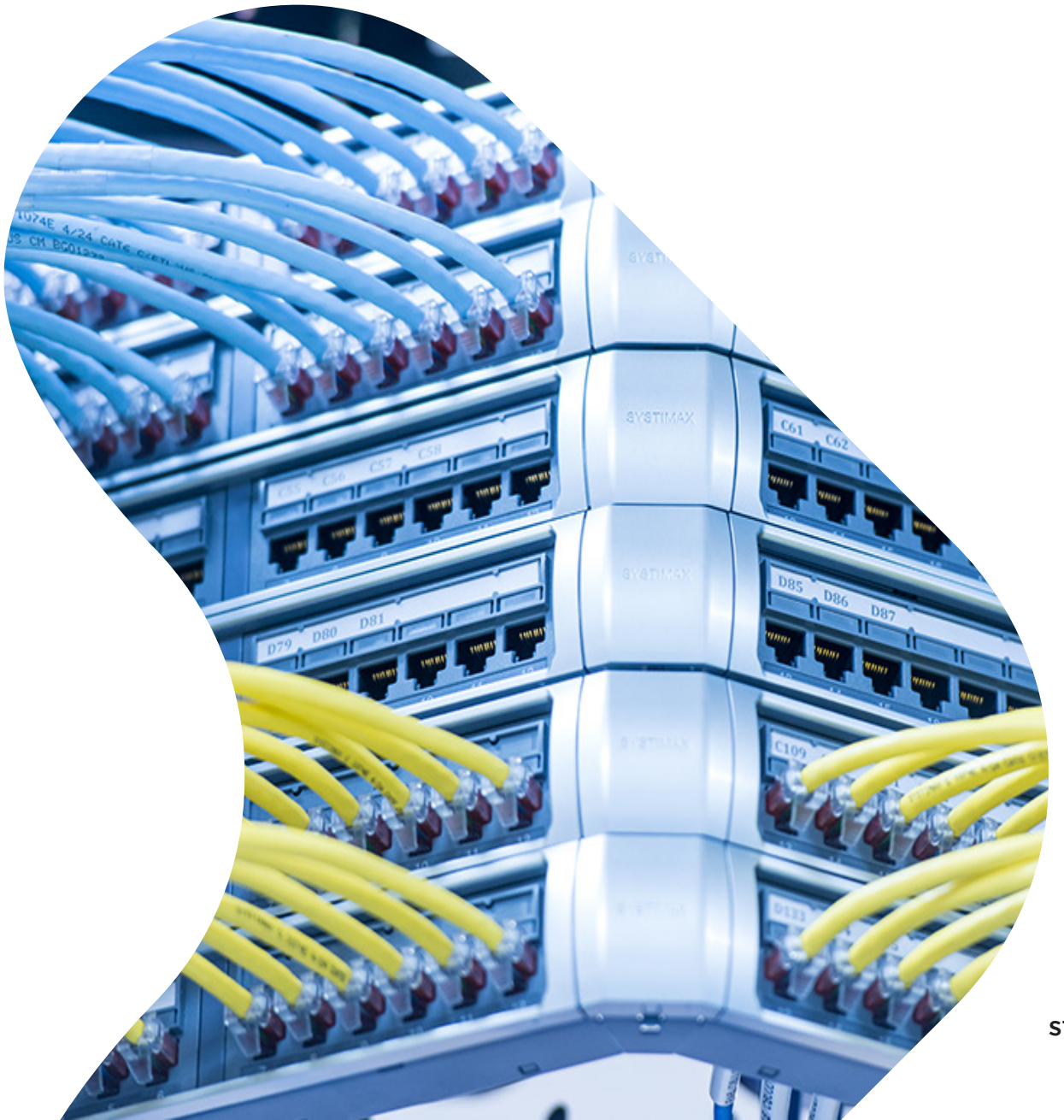
CAT 6A U/FTP vs F/UTP

Keywords:
U/FTP - Unshielded Foiled Twisted Pair
F/UTP - Foiled Unshielded Twisted Pair



Introduction

Physical layer network infrastructure is evolving in response to the rapid technological transformation driven by the need for higher bandwidth and lower latency. This has led to a growing demand for high-performance CAT 6A cables in the market. CAT 6A cables deliver data speeds of upto 10 GBase-T (10 Gigabit Ethernet) and perform well up to a frequency of 500MHz.

While operating at higher frequencies along with 10GBase-T, the presence of interference or noise near the cables can cause packet loss during data transmission. This severely impairs transmission performance. Thus, it is imperative to use cables which provide protection against interference and enhance performance and efficiency.

Shielded cables with metallic barriers are one of the best options available to achieve this outcome as they provide excellent protection from transmission noise. Shielded CAT 6A cabling systems are strongly recommended for high-density data center applications because of their superior performance in curbing Electromagnetic Interference (EMI), and Radio Frequency Interferences (RFIs). However, there are other factors that need to be considered while selecting the right cable including type of installation, EMI, Alien crosstalk (ANEXT), and budgetary constraints.

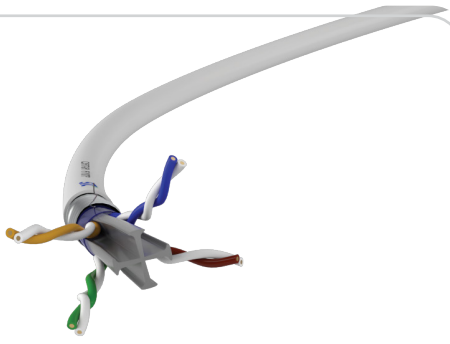
There are multiple variants of CAT 6A cables available including F/UTP, U/FTP, F/FTP and S/FTP to cater to the specific needs of each customer. Outlined below, are the key differences between the F/UTP and U/FTP shielding types based on their construction and performance.

Construction Attributes

In U/FTP cables, every wire pair is surrounded by an aluminum foil shield along with a tinned copper wire, which acts as a drain wire. There is, therefore, no need for a center spline.

F/UTP consists of 4/23AWG unshielded twisted-pair wires surrounded by an overall aluminum foil shield, with a center spline (or cross member) separating each pair. This type of construction is used for CAT 6 UTP and STP cables.

CAT 6A U/FTP

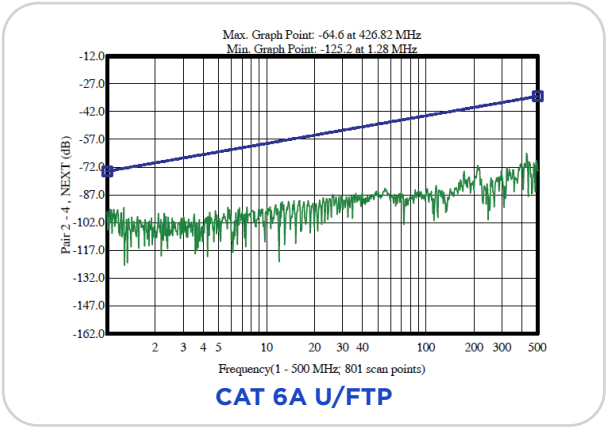


CAT 6A F/UTP

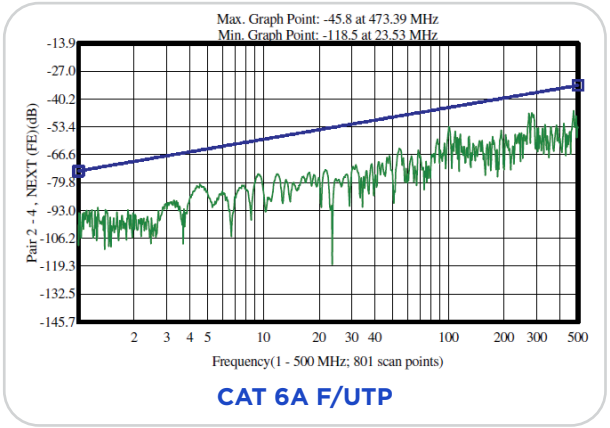
Performance Attributes

Crosstalk and EMI Performance

Crosstalk refers to the situation when the signal in one twisted pair interferes with the signal in another twisted pair. When installed correctly, U/FTP cables, which have very closely shielded individual pairs, provide superior crosstalk and EMI performance with NEXT (Near-end Cross Talk) margin of 15.2 dB. In comparison, F/UTP cables provide a NEXT margin of 8.1 dB.



CAT 6A U/FTP



CAT 6A F/UTP

Ease of Termination

Crosstalk between the four pairs at higher frequencies can be controlled with shorter lay lengths or more twists. In F/UTP cables, the NEXT and FEXT (Far-end Cross Talk) losses are controlled by the lay-length or twists. On the other hand, U/FTP cables have individual foiling on each pair, which mitigate the NEXT and FEXT losses between the pairs. This allows us to have looser lay-lengths or twists in each pair similar to others in U/FTP cables. Looser the lay lengths, easier the termination of U/FTP cables.

Flexible and Easier Routing

Since CAT6A U/FTP cables have no cross separator, their cable diameter is much thinner, making them lighter, more flexible and easier to route. These thinner U/FTP cables also allow for better airflow, thereby saving energy.

Delay Skew

Delay skew is the difference between the propagation delay on the fastest and slowest pairs. Delay skew is important because several high-speed networking technologies, mainly Gigabit Ethernet, use all four pairs in the cable. If the delay on one or more pairs is significantly different from any other pair, signals sent at the same time from one end of the cable may arrive at different times at the receiving end. This will make it impossible to recombine the original signal.

Because of the almost similar lay-lengths or twists in U/FTP cables, their delay skew margin is high, thus eliminating the need for data re-transmission and hence maximizing the data rate.

U/FTP - Long Lays

F/UTP - Short Lays

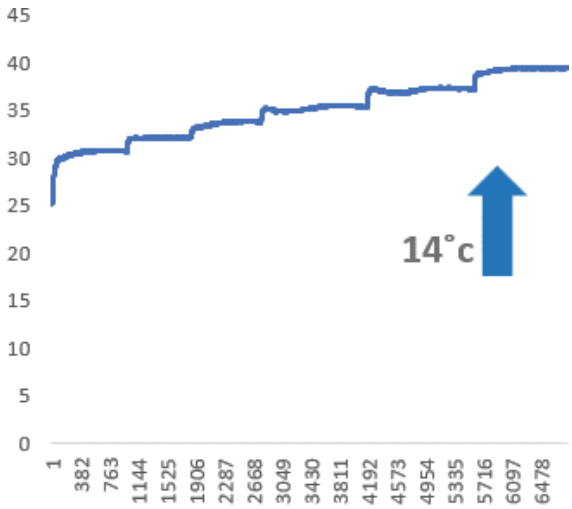
Power Over Ethernet (PoE) Support

As stated above, since U/FTP cables have looser twists with longer lay lengths, their DC resistance on the cable is lower. The individual foil shields also provide better heat dissipation. These are critical for PoE support. The shields minimize temperature increases experienced with PoE.

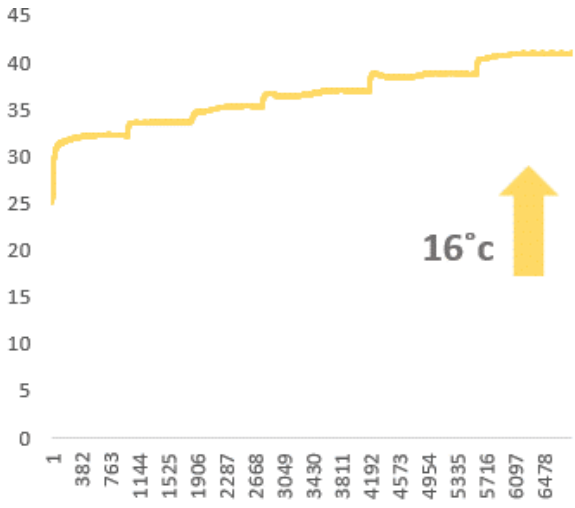
Better heat dissipation is positively correlated with Better PoE support

Extensive tests at STL's SPEL (Specialty Products Experience Lab) facility have shown that the presence of metal shields at pair level improves heat dissipation and minimizes the temperature rise in PoE energized cable bundles.

Heat Dissipation Correlation study between CAT 6A U/FTP and F/UTP



Cat 6A U/FTP



Cat 6A F/UTP

Conclusion

Relative Performance Rating Between CAT 6A U/FTP and CAT 6A F/UTP

Attributes	Cat6A U/FTP	Cat6A F/UTP
Superior EMI Performance	5.0 Rating (NEXT-15.2dB)	3.5 Rating (NEXT-8.1dB)
Easier to Terminate	5.0 Rating	4.0 Rating
Flexible and Easier Routing	5.0 Rating	4.0 Rating
Lower Delay Skew	5.0 Rating (6.18nS)	4.0 Rating (21.89nS)
Better PoE Support	5.0 Rating 14° C	4.0 Rating 16° C

Source: *STL Estimates**

CAT6A U/FTP thus outperforms CAT6A F/UTP cables in many parameters including superior EMI performance, termination ease, flexibility and ease of routing, delay skew and PoE support. U/FTP cable cancels noise or interference from not only EMI-generating sources like fluorescent lights, induction motors and other machinery or equipment, but also from RFI-generating appliances like wireless access points and mobile phones. This robustness has made them popular.

However, not all environments demand the deployment of CAT6A U/FTP cables. They are a preferred choice in areas that have a high concentration of equipment and communication appliances and where minimizing noise levels is an important consideration. They are, therefore, best suited to the healthcare and machine to machine communications, shop floors of automation-intensive plants and factories

Disclaimer: *These test results are subject to change under the influence of many factors like environmental conditions during testing, and these are not minimum guaranteed margins for the respective cable design.*

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